CONNECTING ARRANGEMENT CTH

J53050K INTERCONNECTING UNIT

1. GENERAL

1.01 This section provides identification, installation, operation, maintenance and connection information on the J53050K, List 1 Interconnecting Unit (IU) when used in Connecting Arrangement (CA) CTH. This CA provides a means for connecting customer-provided equipment (CPE), typically call restricting equipment, to a Bell System central office (CO) trunk associated with a Bell System PBX.

1.02 The J53050K IU is equipped with two circuits (for two CO trunks) to interface with CP call restricting equipment.

1.03 Connecting Arrangement CTH does not require the PBX trunk circuit to be equipped for the standard reverse-polarity toll diversion feature. Central office modifications or auxiliary equipment are not required.

1.04 If the customer wants a copy of the Technical Reference which covers this interface specification, the customer should contact the local Telephone Company Business Office or the Marketing Representative.

1.05 This issue of the section is based on the following drawings:

SD-1E259-01, Issue 2—J53050K IU

SD-99361-01, Issue 4B—Relay Delay Timer

If this section is to be used with equipment or apparatus reflecting later issues of the drawings, reference should be made to the SDs and CDs to determine the extent of the changes and the manner in which the section may be affected.

2. IDENTIFICATION

2.01 ***Purpose:*** Permits the CPE to monitor and restrict outgoing calls over a Bell System PBX CO trunk. The duration of the restrict mode is limited and can be overridden by an incoming call.

2.02 ***Application:*** On ground start trunks in the PBX's listed in Table B. May also be used with loop-start 2-way manual CO trunks, typically SD-66719-01 and SD-65781-01.

2.03 ***Ordering Guide:***

- J53050K-1, List 1 Interconnecting Unit (one per two CO lines, Fig. 1)

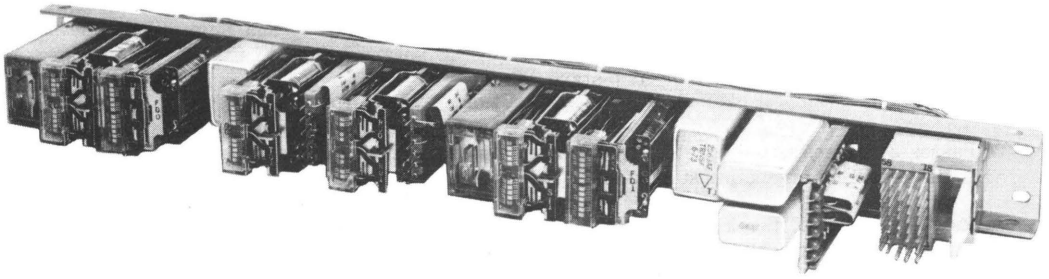

Fig. 1—J53050K Interconnecting Unit

Associated Equipment (Order Separately)

- KS-15620, List 22 Rectifier (or equivalent) required when PBX power supply is insufficient. The rectifier can power a maximum of six IUs
- KS-14532 Power Cord (used with KS-15620 Rectifier)

  List 1—10 ft

  List 2—2 ft

  List 3—15 ft

  List 4—20 ft

  List 5—25 ft
- Cable, Wiring, "D" Inside, or equivalent (for cabling from CA to interface connecting block)
- Block, Connecting, 66M1-50 (Fig. 2)

Note: Other type blocks may be used when specified by local engineering.

- Clip, Bridging, B (25 per pkg.)

2.04 ***Design Features:***

- Mounts on standard 23-inch relay rack or in 16-type apparatus mounting
- Requires maximum of 500 ma at 52 volts or 340 ma at 48 volts dc
- Equipped with 2-circuit delay timer
- For use with ground-start or loop-start trunks
- Passes a call restricted tone (if provided) from the CPE to originating station
- Restores the PBX trunk for incoming or outgoing calls if the CPE does not remove the closure on the CS-CG leads after an originating station has been restricted. In this condition, outgoing calls cannot be restricted.
- Cuts an incoming call through to the PBX when in the restrict mode.

3. INSTALLATION

3.01 Mount the J53050K IU in an area free of dampness and excessive dust or dirt with adequate room for access to front and rear of equipment.

3.02 Locate the 66M1-50 interface connecting block within 25 feet of the J53050K IU. The CP call restricting equipment must be located so that the maximum loop resistance from the J53050K IU does not exceed 50 ohms.

3.03 The J53050K IU mounts on a standard 23-inch relay rack or 16-type apparatus mounting (or equivalent). Use existing rack space in PBX if possible.

3.04 Add straps as shown in Table A to provide circuit options required. Refer to Table B for relay disconnect timing options to match the PBX in use and strap the terminals shown. Refer to Fig. 3 and 4 for wiring connections.

3.05 Use "D" inside wiring cable, or equivalent, to terminate the leads associated with the CPE on the interface connecting block. The CDPT, CDPR, CS and CG leads are always used. If the CGRD and CBAT leads or CTS and CTG leads (options Q and T) are not used, do not run them to the interface block. Stencil lead designations on interface connecting block designation strip (see Fig. 2).

3.06 Use "D" station wire, or equivalent, to connect the tip and ring leads of the IU to the CO lines and the PBX CO trunks.

3.07 The KS-15620, List 22 rectifier will mount on a standard relay rack or in a 16-type apparatus mounting. Where possible mount adjacent to the J53050K IU. The customer must provide a 105- to 130-volt 60-Hz power outlet within reach of available power cords. (See ordering guide for cord lengths.) It is recommended that this outlet be separately fused and not under control of a wall switch. Where local instructions permit, secure the power cord to the outlet with a power cord plug retainer assembly.

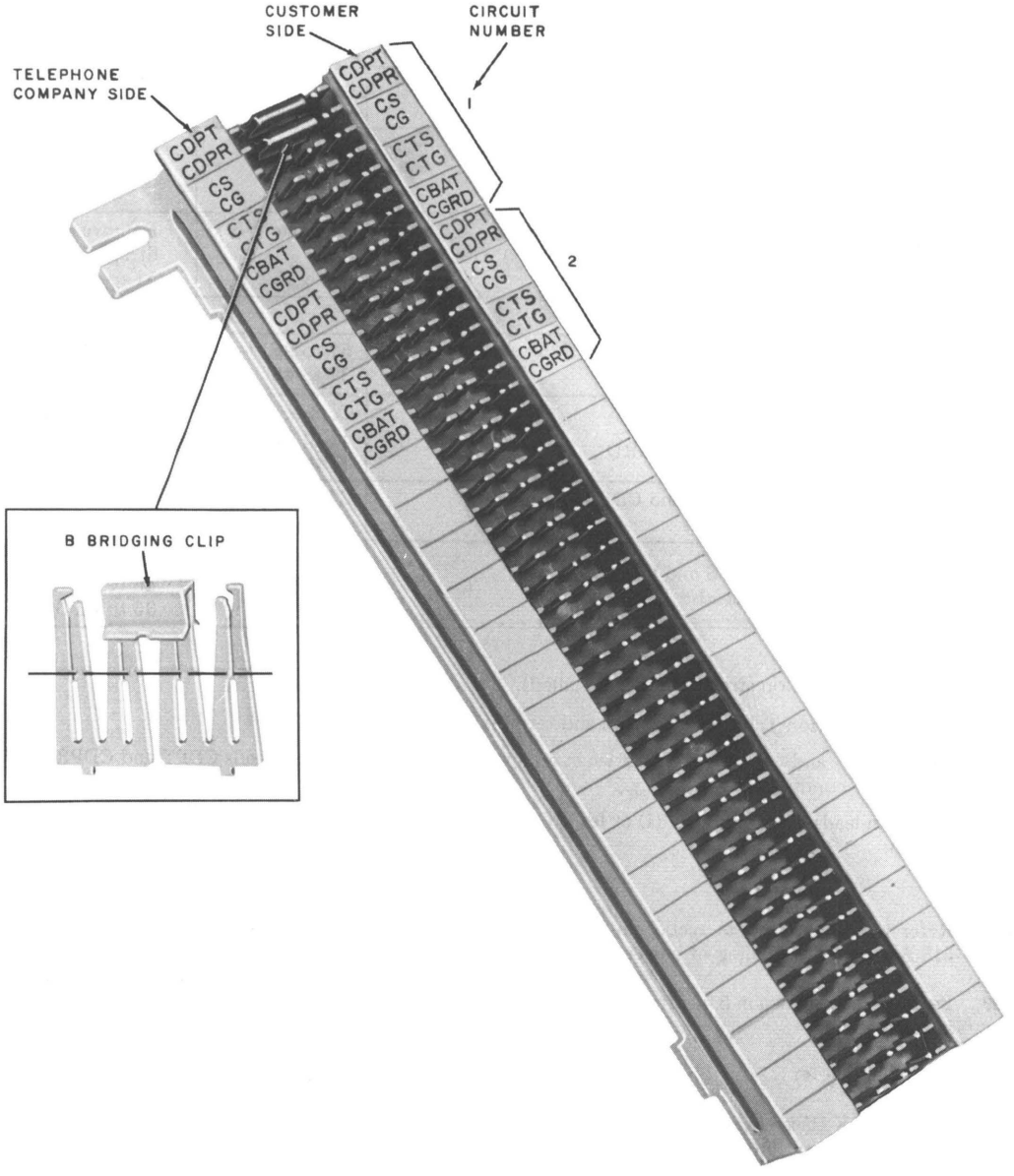

Fig. 2—66M1-50 Interface Connecting Block

TABLE A

CIRCUIT OPTIONS

FEATURE		OPTION	STRAP TERMINALS	
			CKT (0)	CKT (1)
J53050K IU VCA CTH	Connected to GRD Start PBX CO Trunk	V	35 to 45	51 to 12
	Connected to Loop Start PBX CO Trunk	Note 1	Remove Strap 35 to 45	Remove Strap 51 to 12
	Disconnect Time	Note 2		
CDPT and CDPR Leads in Idle Condition, Connected to	Local BAT and GRD	R	57 to 24 37 to 46	24 to 11 53 to 31
	CP Provided BAT and GRD*	Note 3 Q	Connect 57 to CGRD 37 to CBAT	Connect 24 to CGRD 53 to CBAT
Call Restrict Tone Signal From CP Equipment Transmitted on	CDPT and CDPR Leads	S	27 to 47 17 to 18	43 to 14 33 to 34
	CTS and CTG Leads*	T	Connect 27 to CTS 17 to CTG	Connect 43 to CTS 33 to CTG

Notes:

1. Remove V option straps (factory-installed).
2. See timing option Table B for option and terminals.
3. Options R and Q are not used when an open circuit is required on leads CDPT and CDPR during idle condition.

* Do not run leads CBAT and CGRD or leads CTS and CTG to interface block when not used (options R and S).

3.08 Refer to the appropriate section in Division 518 for proper grounding of power plants.

3.09 Perform tests shown in 5.04 after installation is complete.

4. OPERATION (Fig. 4)

4.01 The J53050K IU is equipped with two circuits designated circuit (0) and circuit (1) and provides two CTH connecting arrangements. When the CO trunk on the PBX is seized for an outgoing call, the CP call restricting equipment monitors the off-hook condition and dial pulses or TOUCH-TONE® signals on the line over the high resistance (100K) dc monitoring leads CDPT and CDPR. If the call is to be restricted, a contact closure on the call denial leads CS and CG causes the IU to open the line towards the CO thus releasing the CO connection and closing a transmission path to the CPE. The PBX CO trunk and station are held in the restrict mode for approximately 15 seconds. During this time, the CP call restricting equipment may transmit a call restricted tone to indicate to the originating station that the call has been restricted and should be terminated.

4.02 If an incoming call is present on the CO line during the restrict mode, the IU will detect ringing on the CO line and transfer the PBX CO trunk back to the CO line; and the incoming call will be cut through to the PBX. The IU has no

TABLE B

TIMING OPTIONS

PBX	ASSOCIATED 00 TRK CKT	PROVIDE OPTION	NOMINAL TIME (MS)	STRAP TERMINALS	
				CKT (0)	CKT (1)
701	SD-65657-01	X	950	55 to 36 and 16 to 36	32 to 52 and 22 to 52
	SD-65850-01	X			
	SD-65895-01	X			
	SD-5E001-01	X			
	SD-5E045-01	X			
740	SD-5E001-01	X			
	SD-65657-01	X			
756	SD-65752-01	X			
757	SD-66749-01	X			
	SD-66750-01	X			
	SD-5E016-01	Y	1500	16 to 36	32 to 52
770	SD-1E340-01	Z	2300	55 to 36	22 to 52
800	SD-1E013-01	Y	1500	16 to 36	32 to 52
	SD-1E013-02	Y			
	SD-1E015-01	Y *			
	SD-1E015-01	X †	950	55 to 36 16 to 36	32 to 52 22 to 52
	SD-1E015-02	X			
801	SD-1E306-01	Y	1500	16 to 36	32 to 52
	SD-1E307-01	X	950	55 to 36 16 to 36	32 to 52 22 to 52
805	SD-1E213-01	W	600	26 to 36	42 to 52
812	SD-1E402-01	X	950	55 to 36 16 to 36	32 to 52 22 to 52
	SD-1E403-01	W	600	26 to 36	42 to 52

* Prior to Issue 14.
† Issue 14 and later.

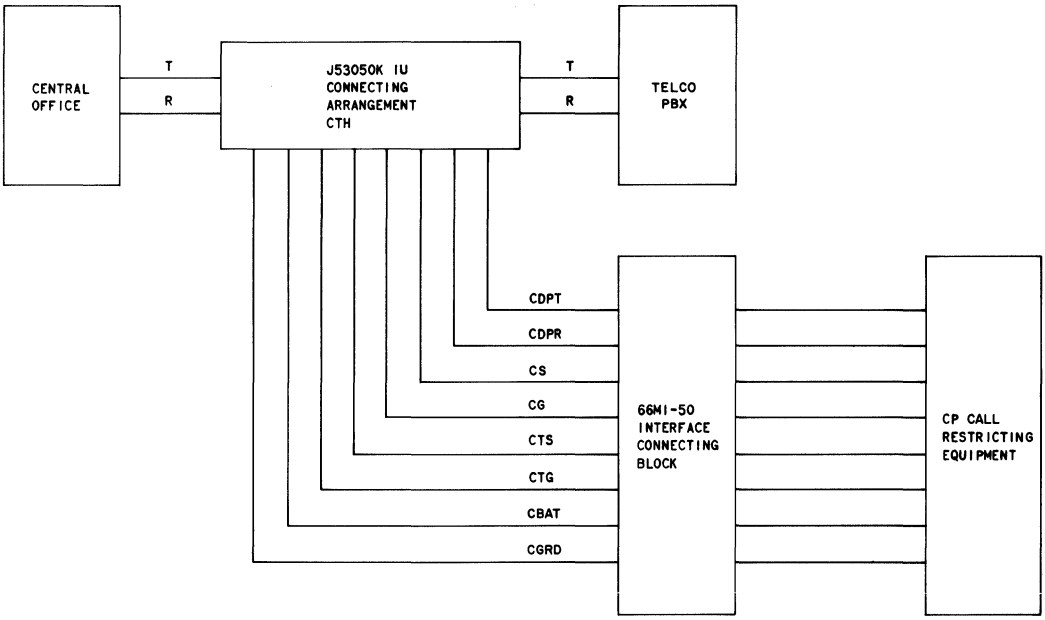

Fig. 3—Block Diagram—Connecting Arrangement CTH

effect on normal incoming calls or on nonrestricted outgoing calls.

4.03 ***Outgoing Call, "V" Option (Circuit 0):*** "V" option is used when the J53050K IU is connected to a ground-start CO line. When the CO trunk is seized by a station behind the PBX, the supervisory relay S operates from CO line current closing contact M1 to operate S1 relay through the 4B contact of the TO relay. S1 relay operated connects the CDPT and CDPR leads to the CO line through R7, EBM2 and R8, EBM3 contacts and closes contact M1 to prepare an operate path for the transfer relay TR over the CS lead. If the CPE does not provide a restrict signal, the S and S1 relays will remain operated until the call has been terminated.

4.04 If the CPE provides a restrict signal by a momentary contact closure (50 ms minimum) on the CS and CG leads, ground on the CS lead will operate the TR relay through EMB10 of the time-out relay TO and M1 of the S1 relay. The TR relay operated opens the loop to the CO and transfers the PBX T and R leads to the CPE with contacts EBM11 and EBM3 through transformer T1 and contact M12. Contact M9 of the TR relay connects the ringing bridge detector across the CO line to detect incoming calls. The TR relay also triggers the timing circuit with ground through contact M8, "V" option strap and contact EBM10 of the FD relay. During the 15-second timing interval, the originating station and PBX CO trunk are in the restrict mode and the CPE may transmit a call restricted tone or signal over the CTS-CTG leads (T option) or CDPT-CDPR leads (S option). After the 15-second time-out, the timing circuit operates the forced disconnect relay FD through contact EBM6 of the FD relay. The FD relay operated locks up to ground through its own M4 contact and contact M8 of the operated TR relay and recycles the time through contact EBM10 and contact B5 of S1 relay. FD relay opens the loop to the PBX CO trunk through contacts B5 and B7, disconnects transformer T1 from CTS and CTG by opening contact B2, and connects either W, X, Y, or Z timing option to the TMR timing circuit through contact EBM11. The open loop to the

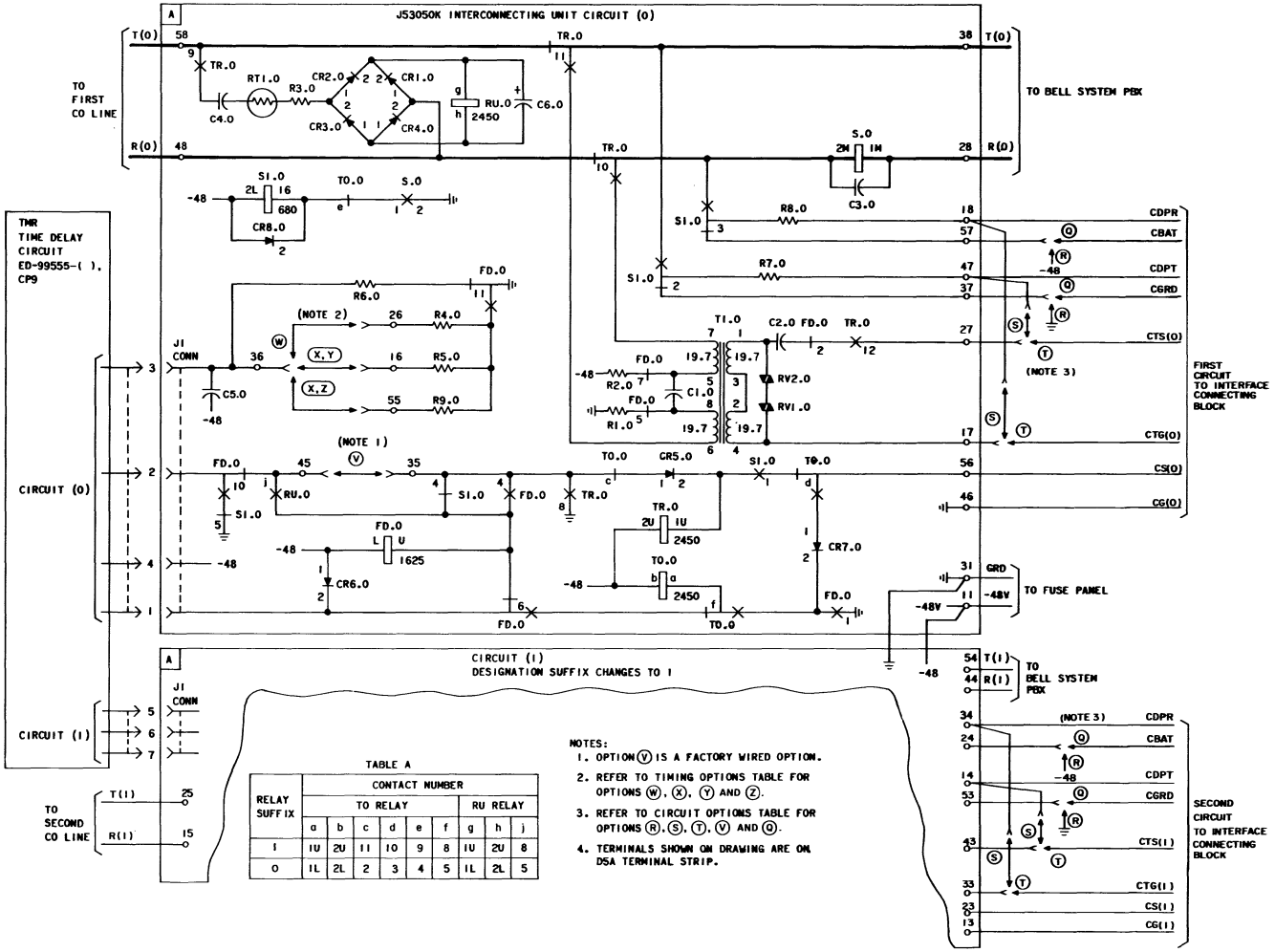

TABLE A

RELAY SUFFIX	CONTACT NUMBER								
	TO RELAY						RU RELAY		
	a	b	c	d	e	f	g	h	j
1	1U	2U	11	10	9	8	1U	2U	8
0	1L	2L	2	3	4	5	1L	2L	5

NOTES:
1. OPTION (V) IS A FACTORY WIRED OPTION.
2. REFER TO TIMING OPTIONS TABLE FOR OPTIONS (W), (X), (Y) AND (Z).
3. REFER TO CIRCUIT OPTIONS TABLE FOR OPTIONS (R), (S), (T), (V) AND (Q).
4. TERMINALS SHOWN ON DRAWING ARE ON DSA TERMINAL STRIP.

Fig. 4—Simplified Schematic and Connections—Connecting Arrangement CTH

PBX will release the S relay, which in turn will release the S1 relay. The S1 relay released will connect ground to the timing circuit to start the W, X, Y, or Z short cycle option timing interval which is necessary to bridge the PBX trunk release time. The S1 relay also disconnects the CDPT and CDPR leads from the line.

4.05 After the option timing interval is completed, the timer applies ground through contacts EBM6 of FD relay and EBM5 of TO relay to operate TO relay. TO relay locks up through contact M1 of FD relay and opens contact M11 to release the TR relay. TR relay released opens contact M9 to disconnect the ringing detector from the line, and reconnect the PBX CO trunk back to the CO line with contacts EBM10 and EBM11, and opens contact M8 to remove the holding ground from the FD relay. FD relay released removes the W, X, Y, or Z timing option and opens contact M1 to remove the holding ground from the TO relay. All relays are now released and the IU circuit is in the idle condition.

4.06 ***Incoming Call During Restricted Interval:*** During the 15-second restricted interval, the station and PBX trunk are connected to the CPE with the S, S1, and TR relays operated. Ringing from the CO will operate the RU relay in the ringing detector. RU relay operated closes contact M5 to apply ground to FD relay through contact M8 of operated TR relay. FD relay operates and cancels the 15-second timeout, disconnects the CTS-CTG leads, and opens the loop to the station and PBX CO trunk (the PBX trunk starts to release). S relay releases causing S1 relay to release. S1 relay released starts W, X, Y, or Z option timing and disconnects leads CDPT and CDPR from the line; the CPE opens leads CS-CG. After the option timing interval is complete, TO relay operates and TR relay releases; the PBX trunk is connected to the CO line to receive the incoming call. The FD, RU, and TO relays release, and the incoming call is completed in the normal manner.

4.07 ***Station Disconnect During Restricted Interval:*** The originating station may go on-hook during the 15-second timing interval, and open the loop on the PBX CO trunk. The open loop would cause the S relay to release. S relay released causes S1 relay to release. S1 relay released disconnects the CDPT and CDPR leads from the line with contacts EBM2 and EBM3 and closes contact M4 to operate the FD relay through contact M8 of the operated TR relay. The sequence that follows is the same as in 4.06 with the IU circuit returning to idle condition.

4.08 ***Disconnect With Permanent Restrict Signal:*** If the originating station has been restricted and the CPE does not remove the contact closure on the CS-CG leads before the 15-second time-out is completed, the sequence of operation takes place as in 4.04 and 4.05 except that the TO relay does not release. The TO relay will lock up to ground on the CS-CG lead through contact EBM10 of the TO relay, diode CR7, and contact EBM8 of the TO relay. All other relays in the circuit are released. This condition will allow outgoing calls to be originated, but not restricted, because the CP call restrictor is unable to detect dial pulsing since the S1 relay is not operated. Incoming calls are received in the normal manner.

4.09 ***Outgoing Call Without "V" Option:*** The "V" option strap is removed when the J53050K IU is connected to a loop start CO line. The sequence of operation is the same as before for originating an outgoing call, with the PBX CO trunk seized and the S and S1 relays operated. The CP call restictor monitors the dial pulsing over the CDPT and CDPR leads. If the call is to be restricted, the CPE provides a momentary contact closure on the CS-CG leads. Ground on the CS lead will operate the TR relay through EBM3 contact of the TO relay and M1 contact of the S1 relay. The TR relay locks up through its own M8 contact and the B2 contact of the TO relay; it also opens the loop to the CO and transfers the station to the CP call restricting equipment with contacts EBM11 and EBM10 through transformer T1 and contact M12. Contact M9 of the TR relay connects the ringing detector across the CO line to detect incoming calls. The station is now in the restrict mode connected to the CP call restricting equipment and will remain in this condition until the station goes on-hook.

4.10 When the station goes on-hook, the loop to the PBX CO trunk is opened and S relay releases. S relay opens contact M1 to release S1 relay. S1 relay released closes contact B4 to ground FD relay through M8 of the TR relay. With the FD relay operated, the sequence of operation is the same as in 4.06 with the IU circuit returning to the idle state.

5. MAINTENANCE

5.01 When trouble is reported, check for blown fuses, loose or broken connections, and check the CO pair to the IU.

5.02 Precautions should be taken when performing tests to avoid affecting service to the customer. Local instructions should be followed with reference to notifying the customer before performing tests.

5.03 Open the leads to the circuit under test by removing the B bridging clips at the 66M1-50 interface connecting block. Make all test connections on the Telephone Company side of the interface connecting block.

5.04 ***Tests:*** J53050K Interconnecting Unit

Note: −48 volt battery may be present on the CBAT lead at the interface connecting block. Avoid shorting this lead to ground or other leads.

(a) Outgoing call—Connect a 1013A (or equivalent) hand test set to the T and R terminals to the PBX for the circuit under test (busy out trunk at PBX). Place the hand test set in the TALK position and relays S and S1 will operate (on ground start trunks S and S1 will not operate until ground in placed on ring and CO responds with ground on tip). Momentarily ground the ring side of the line (ground start trunk only) and dial tone from the CO will be received. Dial the test desk and request ringing voltage be applied to line.

(b) Restricted call and incoming call during restrict—Momentarily strap terminals CS and CG and relay TR will operate transferring the PBX trunk and 1013A hand test set from the CO line to the transmission path from the CPE. The ringup bridge will be connected across the T and R to the CO, and RU relay will operate from ringing voltage causing relay FD to operate, and the PBX trunk and 1013A hand test set will be transferred back to the CO line.

(c) Time-out during restricted call—Place a strap on terminals CS and CG and relay TR will operate to transfer PBX trunk and 1013A hand test set from CO line to the transmission path from the CPE. In approximately 15 seconds the timer will time out, the FD relay will operate to force disconnect, and the PBX trunk and 1013A hand test set will be transferred back to the CO line. The TO and S relays will be operated. All other relays will be released.

5.05 If tests are satisfactory, remove all test connections to return circuit to normal and replace B bridging clips on 66M1-50 interface connecting block.

5.06 When trouble is suspected in the J53050K IU, isolate the trouble and clear it using standard maintenance procedures.

5.07 When trouble is indicated in the transmission path (T and R), use normal practices to perform circuit transmission tests.

5.08 When in the repairman's judgment the trouble is located in the CPE, the Repair Service Bureau should be notified so that proper Maintenance of Service Charge billing can be initiated as outlined in Section 660-101-312 entitled Maintenance of Service Charge on Services With Customer-Provided Equipment (CPE).

Do not attempt any tests or repairs on the CPE.

6. CONNECTIONS

6.01 For connecting information refer to Fig. 4 and Tables A and B.

6.02 Four, six or eight leads may be run to the interface block depending on requirements of the CPE. The monitoring leads CDPT-CDPR and the call restricting leads CS-CG are always required. The restricted tone leads, CTS-CTG (option T), are provided when the CPE requires separate leads for returning the call restricted tone. The customer power leads CBAT and CGRD (option Q) are provided when the customer supplies battery to his CDPT and CDPR leads in the idle condition.